ed claims.

What is claimed is:

1. A method of determining a threshold arrangement for generating a gradation image to determine a position of at least one threshold of the same value for a next gradation when positions of thresholds ranging from a smaller threshold to a threshold for a given gradation are determined in a threshold arrangement, comprising the steps of:

(A) determining at least one candidate position for the position of at least one threshold of the same value for the next gradation (step S5); and

(B) determining the position of the threshold for the next gradation from said candidate position (steps S6 - S9)

said step (B) comprising the steps of:

extracting a low-frequency component from image data obtained based on the threshold arrangement in which the positions of the thresholds ranging to said threshold for the given gradation are determined (1st step; step S7);

determining a low-frequency component intensity at said at least one candidate position (2nd step; step S8);

determining the candidate position where the determined low-frequency component intensity is weakest as the position of the threshold for the next gradation (3rd step; step S9); and

repeating said step of extracting a low-frequency component, said step of determining a low-frequency component intensity, and said step of determining the candidate posi-

tion until all positions of at least one threshold of the same value for the next gradation are determined.

2. A method according to claim 1, wherein said threshold arrangement comprises a threshold arrangement for generating a halftone dot gradation image.

3. A method of determining a threshold arrangement for generating a gradation image to determine a position of at least one threshold of the same value for a next gradation when positions of thresholds ranging from a greater threshold to a threshold for a given gradation are determined in a threshold arrangement, comprising the steps of:

(A) determining at least one candidate position for the position of at least one threshold of the same value for the next gradation (step S5); and

(B) determining the position of the threshold for the next gradation from said candidate position (steps S6 - S9)

said step (B) comprising the steps of:

extracting a low-frequency component from image data obtained based on the threshold arrangement in which the positions of the thresholds ranging to said threshold for the given gradation are determined (1st step; step S7);

determining a low-frequency component intensity at said at least one candidate position (2nd step; step S8);

determining the candidate position where the determined low-frequency component intensity is strongest as the posi-

tion of the threshold for the next gradation (3rd step; step S9); and

repeating said step of converting image data, said step of determining a low-frequency component intensity, and said step of determining the candidate position until all positions of at least one threshold of the same value for the next gradation are determined.

4. A method according to claim 3, wherein said threshold arrangement comprises a threshold arrangement for generating a halftone dot gradation image.

5. A method of determining a threshold arrangement for generating a gradation image to determine a position of at least one threshold for a next gradation when positions of thresholds ranging from a smaller threshold to a threshold for a given gradation are determined in a threshold arrangement, comprising the steps of:

extracting a low-frequency component from image data obtained based on the threshold arrangement in which the positions of the thresholds ranging to said threshold for the given gradation are determined (1st step; step S7); and

determining the position where the intensity of the extracted low-frequency component is weakest as the position of the threshold for the next gradation (2nd step; step S9).

6. A method according to claim 5, wherein said thresh-

old arrangement comprises a dither matrix.

7. A method of determining a threshold arrangement for generating a gradation image to determine a position of at least one threshold for a next gradation when positions of thresholds ranging from a greater threshold to a threshold for a given gradation are determined in a threshold arrangement, comprising the steps of:

extracting a low-frequency component from image data obtained based on the threshold arrangement in which the positions of the thresholds ranging to said threshold for the given gradation are determined (1st step; step S7); and

determining the position where the intensity of the extracted low-frequency component is strongest as the position of the threshold for the next gradation (2nd step; step S9).

8. A method according to claim 7, wherein said threshold arrangement comprises a dither matrix.

9. An apparatus for generating gradation image data, comprising:

a recording medium for storing a plurality of threshold arrangements for generating gradation image data;

selecting means for selecting a threshold arrangement from the threshold arrangements stored in said recording medium; and

gradation image data generating means for generating

gradation image data using the threshold arrangement selected by said selecting means;

wherein each of the threshold arrangements stored in said recording medium comprises such a threshold arrangement that a low-frequency component is extracted from gradation image data generated by said gradation image data generating means based on a threshold arrangement ranging from a smaller threshold to a threshold for a given gradation, and thereafter the position of a threshold for a gradation next to said given gradation is a position where a low-frequency component is weakest among the extracted low-frequency component.

10. An apparatus for generating gradation image data, comprising:

a recording medium for storing a plurality of threshold arrangements for generating gradation image data;

selecting means for selecting a threshold arrangement from the threshold arrangements stored in said recording medium; and

gradation image data generating means for generating gradation image data using the threshold arrangement selected by said selecting means;

wherein each of the threshold arrangements stored in said recording medium comprises such a threshold arrangement that a low-frequency component is extracted from gradation image data generated by said gradation image data generating

means based on a threshold arrangement ranging from a greater threshold to a threshold for a given gradation, and thereafter the position of a threshold for a gradation next to said given gradation is a position where a low-frequency component is strongest among the extracted low-frequency component.

11. A method of determining a threshold arrangement for generating a gradation image to determine a position of at least one threshold of the same value for next higher and lower gradations when positions of thresholds for a given gradation are determined in a threshold arrangement, comprising the steps of:

(A) determining at least one candidate position for the position of at least one threshold of the same value for the next gradation (step S5); and

(B) determining the position of the threshold for the next gradation from said candidate position (steps S36 - S39, S46 - S49)

said step (B) comprising the steps of:

extracting a low-frequency component from image data obtained based on the threshold arrangement in which the positions of the thresholds ranging to said threshold for the given gradation are determined (1st step; steps S37, S47);

determining a low-frequency component intensity at said at least one candidate position (2nd step; steps S38, S48);

determining the candidate position where the determined low-frequency component intensity is weakest as the position of the threshold for the next higher gradation, and determining the candidate position where the determined low-frequency component intensity is strongest as the position of the threshold for the next lower gradation (3rd step; steps S39, S49); and

repeating said step of converting image data, said step of determining a low-frequency component intensity, and said step of determining the candidate position until all positions of at least one threshold of the same value for the next gradation are determined.

12. A method of determining a threshold arrangement for generating a gradation image to determine a position of at least one threshold of the same value for next higher and lower gradations in a plurality of different gradations when positions of thresholds for the different gradations are determined in a threshold arrangement, comprising the steps of:

(A) determining at least one candidate position for the position of at least one threshold of the same value for the next gradation (steps S65, S75); and

(B) determining the position of the threshold for the next gradation from said candidate position (steps S66 - S69)

said step (B) comprising the steps of:

extracting a low-frequency component from image data

obtained based on the threshold arrangement in which the positions of the thresholds ranging to said threshold for the given gradation are determined (1st step; steps S76 - S79);

determining a low-frequency component intensity at said at least one candidate position (2nd step; steps S68, S78);

determining the candidate position where the determined low-frequency component intensity is weakest as the position of the threshold for the next higher gradation of the different gradations, and determining the candidate position where the determined low-frequency component intensity is strongest as the position of the threshold for the next lower gradation of the different gradations (3rd step; steps S69, S79); and

repeating said step of converting image data, said step of determining a low-frequency component intensity, and said step of determining the candidate position until all positions of at least one threshold of the same value for the next gradation are determined.

13. A method of determining a threshold arrangement for generating a gradation image to determine a position of at least one threshold of the same value for next higher and lower gradations when positions of thresholds for a given gradation are determined in a threshold arrangement, comprising the steps of:

converting image data obtained based on the threshold

arrangement at said given gradation into data in a frequency space and extracting a low-frequency component from the converted data (1st step; steps S124, S224);

determining the position where the intensity of the extracted low-frequency component is weakest as the position of the threshold for the next higher gradation;

determining the position where the intensity of the extracted low-frequency component is strongest as the position of the threshold for the next lower gradation (2nd step; steps S125, S225); and

repeating said step of converting image data and said steps of determining the position until all positions of at least one threshold of the same value for the next gradation are determined.

14. A method of determining a threshold arrangement for generating a gradation image to determine a position of at least one threshold of the same value for next higher and lower gradations in a plurality of different gradations when positions of thresholds for the different gradations are determined in a threshold arrangement, comprising the steps of:

converting image data obtained based on the threshold arrangement at said given gradation into data in a frequency space and extracting a low-frequency component from the converted data (1st step; steps S324, S424);

determining the position where the intensity of the ex-

tracted low-frequency component is weakest as the position of the threshold for the next higher gradation of the plurality of different gradations;

determining the position where the intensity of the extracted low-frequency component is strongest as the position of the threshold for the next lower gradation plurality of different gradations (2nd step; steps S325, S425); and

repeating said step of converting image data and said steps of determining the position until all positions of at least one threshold of the same value for the next gradation are determined.

15. A method according to claim 1, wherein said step of extracting a low-frequency component comprises the step of:

weighting a low-frequency component according to human visual characteristics and extracting the weighted low-frequency component.

16. A method according to claim 3, wherein said step of extracting a low-frequency component comprises the step of:

weighting a low-frequency component according to human visual characteristics and extracting the weighted low-frequency component.

17. A method according to claim 5, wherein said step of extracting a low-frequency component comprises the step of:

weighting a low-frequency component according to human

visual characteristics and extracting the weighted low-frequency component.

18. A method according to claim 7, wherein said step of extracting a low-frequency component comprises the step of:

weighting a low-frequency component according to human visual characteristics and extracting the weighted low-frequency component.

19. A method according to claim 11, wherein said step of extracting a low-frequency component comprises the step of:

weighting a low-frequency component according to human visual characteristics and extracting the weighted low-frequency component.

20. A method according to claim 12, wherein said step of extracting a low-frequency component comprises the step of:

weighting a low-frequency component according to human visual characteristics and extracting the weighted low-frequency component.